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NOTES ON THE DIAGNOSIS OF BRONCHOPNEUMONIA AND
ITS COMPLICATIONS.

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REFERENCE to any standard text will lead to the inference that primary bronchopneumonia in adults is not a common disease. That it is the usual type of pneumonia in children is accepted as well as that "terminal pneumonias" are commonly of the catarrhal variety. But that bronchopneumonia is at all confined to the extremes of life, childhood and old age is, I believe, incorrect. It will be the purpose of this paper to present evidence indicating the frequency of this type of pneumonia, to discuss the several pathologic and clinical pictures that may be grouped under the generic heading of broncho- or lobular pneumonia and their more serious complications.

In assuming a position which may seem at variance with usual conceptions of incidence, an explanation is appropriate as to why bronchopneumonia may at times escape detection and be passed over as simple bronchitis. The explanation is simple: (1) the physical signs are frequently transitory, and (2) the patient may not seem sick—that is, sick enough to excite careful examination. Pneumonia is closely associated in our mind with a group of rather definite symptoms and, in the absence of these, the examination made is liable to be either perfunctory or entirely omitted. The

fleeting, evanescent character of the physical signs can hardly be appreciated unless one has experience in ward-teaching. Time and again the signs found at morning rounds were gone in the area marked when the patient was shown at the afternoon clinic, and this explains the development of hospital routine regarding radiograms. The instructor was at times in sore need of demonstrable evidence. From this the logical step was natural of radiographing many cases of "simple bronchitis" in which no sign of consolidation had at the time been noted. The results of these examinations were illuminating; at first in revealing what we did not detect and later in confirming a suspected lesion. What interpretation is to be placed upon a record of this sort? A healthy man of twenty-six years was admitted to hospital January 20 complaining of a cold which he attributed to a wetting two days before. He had felt a little feverish the night before admission, but not sick. He said he did not feel sick enough to be in bed, but a "bit fagged." His temperature was 101°, respiration 22, pulse 90. Examination showed only rales scattered throughout both lungs: No dulness; no change in breath sounds; pectoriloquy absent. A radiogram taken on the day of admission showed an area of density, the size of an egg, just above the heart shadow in the left chest an inch from the hilus of the lung. On January 22 the shadow was still present: the patient had improved and the fever had gone. A final plate, taken on January 28, showed only a slight residual clouding in the area mentioned. At no time had there been physical signs other than those of a bronchitis (rales): at no time had the patient seemed or felt really ill. A repetition of this experience over and over gave ground for the hospital dictum—"bronchitis is rarer than a bronchopneumonia"—and this apparently extravagant assertion accords with my experience in private practice. That the patient may not feel sick, nor look more so than one does with a cold, that the temperature is but slightly elevated is sufficient explanation for neglect of searching examination. History records the "incidence of most diseases has increased with their recognition."

Not only is bronchopneumonia a very common disease in hospital practice, but the incidence will be found high among healthy young men in colleges, as I have had opportunity to observe, and it was one of the common diseases in the cantonments at periods when no epidemic prevailed. Furthermore the nature of disorders which are traced back to "colds" would be best explained by pneumonia, and these disorders are not few.

Bronchopneumonia, as the name indicates, is very often purely an extension of an infection from the smaller bronchi to contiguous pulmonary tissue. The disease seems to have been first described by Bartels, although Laennec mentioned the scattered areas of infiltration found in some cases of catarrhal bronchitis. Common usage has made the terms bronchopneumonia and lobular pneu-

monia synonymous. Some pathologists, however, draw distinctions which are not generally accepted, and until the processes are better understood in their mode of production, are useless. The morphology of broncho- or lobular pneumonia is determined largely by the type of infection, and, to some extent at least, by whether the infection enters through the respiratory tract or the blood stream. The more general aspects which characterize the pathology of lobular pneumonia have a common basis in all types. On section of the diseased lung the fresh surface has a notably "patchy" character; certain areas are raised, and at the center of these areas may usually be found the bronchi, seen as grayish spots from which pus may be expressed. The involved areas may be numerous and discrete, or they may coalesce into large consolidations; even when a considerable portion of a lobe is involved in the consolidation the picture does not often resemble lobar pneumonia. The cut surface is less granular and there is not liable to be much fibrin or leukocytic detritus as with lobar pneumonia. Between the areas of consolidation atelectasis occurs, due to stoppage of the bronchioles, with resorption of air and resulting collapse of the alveoli. In its earliest stage scattered areas of bronchopneumonia may appear as numerous discrete, minute tubercles, shotty to feel, gray or brownish in color, and surrounded by areas of reddish atelectatic tissue. When the lung presents this picture at necropsy it may be mistaken for miliary tuberculosis (and the radiogram is equally misleading). A later stage represents the enlargement of these small areas with coalescence. Thus a whole lobe may be involved, but the patchy character of the cut surface is usually preserved: massive, confluent, lobular pneumonia. Minor differences are determined, it seems, by the nature of infection and the resistance of the individual. The salient fact in this pathologic process is that it takes origin in a bronchiole. Following a bronchus into a diseased portion of the lung by dissection discloses that the consolidation is terminal or lateral to a bronchus.

Bronchopneumonia is usually thought of as a complication of typhoid fever ("typhoid pneumonia"), measles, diphtheria and occasionally of scarlet fever. The causative infecting agents are numerous. With the primary type of bronchopneumonia the pneumococcus is often found, even Type I pneumococci has been repeatedly isolated from sputum of some of my cases. Pneumococcus type IV is more common, while probably a majority of the cases of lobular pneumonia are due to streptococci, either as a primary infection or mixed with some other organism. The role of the streptococcus in these processes is by no means clear, in spite of the fact that it has been repeatedly isolated from both the sputum and from the lung tissues of cases dead of pneumonia. The reason for some doubt rests in the conception that the streptococcus infections are prone to be secondary. Weichselbaum illustrated the point

years ago with reference to empyema, which may, in the initial stage, show only pneumococci in the pus; later the pneumococci are overgrown and disappear and the pus contains only streptococci.¹ For example, measles pneumonia, a typical secondary infection, is predominantly a streptococcus pneumonia. The primary invader may be an organism of relatively slight virulence, but, given a predisposition, the tissues are made vulnerable by this trivial infection and the streptococcus finds a suitable environment for growth. Coryza is often due apparently to an invasion of the *Micrococcus catarrhalis*, an organism of weak pathogenicity, a secondary infection with streptococcus takes place and pneumonia develops. This expresses the present conception of the mode of origin of a group of diseases due to streptococcus infections, and it is the sole scientific basis for the face mask so much used in military hospitals; protecting an individual susceptible on account of some slight infection from inhaling streptococci thrown out by persons already infected. The practical difficulty in this prophylaxis is that so many healthy persons harbor *Streptococcus hemolyticus* in the throat. Mathers found hemolytic streptococci in the throats of 70 per cent. of a healthy organization at Camp Meade. These questions have not only scientific interest, but are in the front rank of practical considerations when diseases such as measles are to be cared for. For some time pediatricists have recognized that the incidence of pneumonia complicating measles is higher in even very good hospitals than among children cared for in their homes, and an impression growing toward conviction is notable that, under certain conditions, pneumonia may spread as a contagion in measles wards. The factor that is outstanding in my experience in determining the incidence of pneumonia complicating measles is the season of the year; in the cold months there has been a higher percentage of pneumonia than occurred in the warm parts of the year, and this has been true even with the most rigid methods of individual isolation. Is the body's resistance so generally lowered by cold weather?

The factors which predispose to pneumonia may be classed under two headings: those which lower the vitality of the individual and those which lower the resistance of the pulmonary tissues. Under the first heading would come not only the diseases generally recognized as terminating with bronchopneumonia, chronic and cachectic diseases and certain acute infections, such as the exanthemata, but also those conditions which suddenly reduce immunity, and here fatigue takes first place. With sound, healthy individuals no factor seems to be so potent in lowering resistance to infection as is fatigue. Probably this is in some degree true of all infections; it can hardly

¹ The advent of filtrable viruses further complicates the question and postpones definite decision. In relation to this question, see the communication of Roux to the Académie des Sciences, at the November meeting, 1918, dealing with pathogeneses of influenza.

be controverted in relation to pneumonia. Other factors of significance are hunger and chilling from exposure. All of these factors more or less enter into consideration with all types of pneumonia, lobar as well as lobular. In one case the invasion is prompt and sudden and lobar pneumonia develops; in another, more insidious or perhaps in the beginning milder, a "simple cold" with bronchopneumonia later.

Of the factors which lower the resistance of pulmonary tissues mild and even trivial infections are paramount: trivial infections are ignored. It was notable in all cautions that those organizations that sent their cases of minor sickness to hospital had the lowest incidence of pneumonia. The significance is clear: with a mild bronchitis a bed is the best prophylactic against pneumonia. The resistance of pulmonary tissues to infection is also lowered by mechanical and chemical irritation; dust, especially sand, gases and smoke, ether and chloroform. Postoperative pneumonia is due evidently to several factors: the technical skill of the operator, the purity of the ether and skill of administration and the care of the patient during the period while he is recovering from the anesthetic, especially respecting warmth. In several clinics, where opportunity has come to me to study many cases of pneumonia following operation, I have not been able to trace the cause nearer than outlined above. The question is important and deserves more careful study than has been given to it.

In *resume*, it may be briefly stated that any circumstance which lowers the vitality of the organism as a whole, or by irritation injures the pulmonary tissues, locally, predisposes to pneumonia. The invader is always at hand and the invasion depends upon the host.

Symptoms. The clinical picture of bronchopneumonia is most variable. At one extreme is the case with signs and no symptoms other than fever, at the other extreme is a clinical picture of the severest form of pneumonia. In truth, there are cases with marked symptoms and no corresponding signs, and others with slight symptoms and clearly defined signs. The mild cases offer some difficulty in diagnosis and are often overlooked, although deserving attention on account of the frequent sequelae. It so often happens that the patient seeks help only on account of an annoying cough. With scarcely any pyrexia the tendency is natural to dismiss the case as one of acute bronchitis requiring no thorough examination of the lungs. Allowed up and about, perhaps at work, the patient's condition becomes serious before its nature is recognized. I have known this to occur not infrequently. The patient then takes to his bed only when exhausted or in collapse. With pneumonia little enough can be done for the patient other than securing him rest and protection of his vitality, and this should not be delayed.

Occasionally the period of active infection is passed before the

patient consults a physician. A number of cases belonging in this category have been encountered where relief was sought from a persistent cough following a "hard cold," and examination disclosed an area of consolidation, but no fever or other sign or symptom. Delayed resolution of this sort may be, and often is, mistaken for a tuberculous consolidation. A young physician consulted me for a confirmation of the diagnosis of pulmonary tuberculosis made by a specialist. The patient had had a severe bronchitis some two weeks before but had kept at work in spite of fever. The physical signs were confined to an area in the upper portion of the left lower lobe—a consolidation a couple of inches in diameter. This spot slowly resolved in the course of a month. With vigorous, sthenic individuals, bronchopneumonia is, I am convinced, occasionally experienced as a "bronchial cold," and with no more results.

The onset is occasionally sudden, resembling in this respect lobar pneumonia; more often there is a gradual development, commencing as a "cold," with slight cough, becoming more severe until the patient is driven to his bed. Pleural involvement occurs late in contrast to lobar pneumonia. In the early period of the disease the temperature may not be above 101° F., the pulse but slightly increased and the respirations not accelerated. Drenching sweats are common; cough is annoying and exhausting. The sputum varies; there may be considerable amounts of mucopurulent material, with no obvious admixture of blood—with other cases the sputum is greenish pus, or, again, it resembles brick dust in color. When the infection is severe, dyspnea is often a striking symptom, and this, with the marked cyanosis, recalls the old name of the disease "suffocative catarrh." With many cases death appears to result from asphyxia rather than from a wearing out of the myocardium, as in lobar pneumonia.

The nervous symptoms are most striking. Delirium is common, not of the low, muttering type, but violent, often maniacal. A peculiar typhoid state with delirium, marked tremor and coma vigil is occasionally noted. Many patients complain of excruciating headache, and with this signs of meningismus are frequent. Relief is often prompt, following lumbar puncture and the removal of a half ounce of fluid. Headache with a stiff neck and a suggestive Kernig sign is an indication for lumbar puncture. The fluid in these conditions is under considerably increased pressure—the first half-ounce running so fast the drops cannot be counted. I have gained the impression that with some of these cases not only does the headache abate, but respiration is improved by relieving the intracranial pressure.

With severe bronchopneumonia the picture at times presented by the patient when the disease is at its height differs in many respects from lobar pneumonia. The deep, livid cyanosis arrests attention. The picture of suffocation with an excited, alert mental

state; the sweating; cold, clammy extremities in spite of a strong, regular pulse—a clinical picture not readily overlooked.

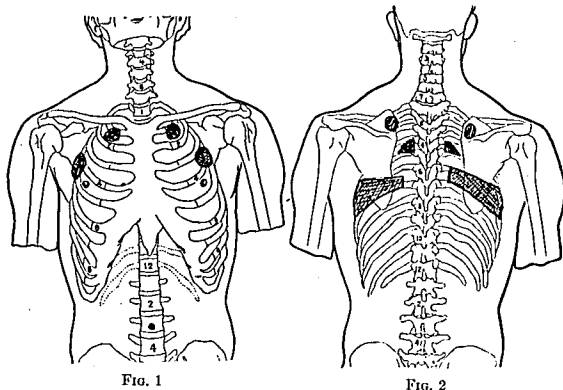
A type of pneumonia called interstitial is seldom recognized clinically, except by inference. The early symptoms suggest the onset of lobar pneumonia. Examination of the patient discloses signs of fluid in the pleural cavity. These are the cases of primary empyema (so called). The characteristic feature is the rapid formation of the pus. A patient having only symptoms of an infection may, within six or eight hours, develop symptoms of intrathoracic pressure, with signs indicating a pleural cavity full of fluid. To one who has not watched such cases and seen the pus return after aspiration and fill a cavity overnight the peculiar feature of this infection is scarcely creditable. Interstitial pneumonia received some attention in cantonment hospitals during last winter. Kaufmann's² classical description covers the essential features of the pathology.

Diagnosis. The diagnosis of bronchopneumonia cannot invariably be arrived at from the physical signs alone. Those somewhat unusual cases of multiple, discrete foci give none of the typical signs of consolidation, and these could not be expected when the foci are no larger than peas. The picture presented by the radiogram is misleading to the unwary and is not infrequently regarded as miliary tuberculosis, which, indeed, it may resemble post mortem. The signs in these cases are those we customarily associate with bronchitis. There is, however, something more than rales to be heard; a variability in the intensity of the breath sounds in contiguous areas is peculiar and arrests attention if one be on the lookout for this phenomenon. However, in some cases the diagnosis must be inferred, the temperature being too persistent and an increased respiratory rate speaking against bronchitis. When possible to procure one, stereoscopic radiograms may aid in confirming the diagnosis.

Even relatively small areas of consolidation are detectable by a skilled technic. Unless the area involved be near the costal pleura, however, impairment of resonance and frank change in breath sounds will not be notable. The change in the character of the signs over suspected spots at different examinations is in itself significant. The fleeting and migratory character of the consolidations in lobular pneumonia is peculiar to the disease. The earliest definite sign, and the one of most help when other signs are equivocal, is the change in the whispered voice which is transmitted to the ear with an abnormal clearness and with a slight nasal quality. Transmission of the whispered voice is a helpful sign in the recognition of changes of density in the lung substance and is often the earliest sign in all types of pneumonia. Because this sign is so frequently neglected some amplification is appropriate. A confusion exists in the minds

² Speziellen Path. Anat., 1911, 261.

of many concerning the significance of variations in the transmission of sound vibrations, because the attention is given only to intensity or loudness of sound, whereas variations in quality of the sound or in its pitch are even more significant and the examiner must take pains to keep these several features entirely distinct. For example, sounds of low pitch are better transmitted to the chest wall through normal lung than are equally intense sounds of higher pitch. With a solid lung, on the other hand, vibrations of all pitch are equally well transmitted. In bronchopneumonia small areas of consolidated lung substance are surrounded by air-containing lung, and this latter appears to "dampen" some vibrations more than others; the overtones being least affected are transmitted to the chest wall. Another factor is the bone conduction of the spoken voice which enters as a confusing element in auscultation; this confusion is less



pronounced or negligible in whispered pectoriloquy. Flint called attention to elevation of pitch as a sign of consolidation and the nonessential factor of mere intensity of sound.³ It has repeatedly happened that whispered pectoriloquy was the only definite physical sign over small areas where consolidation was demonstrated by radiogram. Where the consolidation is of considerable size there is usually no difficulty in its recognition.

Bronchopneumonia, alike with lobar pneumonia, shows a predilection for the lower lobes and is noted most frequently in certain areas which are illustrated in the charts (Figs. 1 and 2). The mild cases, infections of low virulence, may not come under observation until

³ See a clarifying analysis of these factors by Adams and Montgomery, Jour. Am. Med. Assn., 1910, lxxii, 987.

convalescence, and then the question of tuberculous infection is often uppermost. The site of the consolidation is of help in decision on this question, as tuberculous infections are not usually located in the bases of the lungs. The confusion of tuberculosis with delayed resolution of bronchopneumonia has been the subject of frequent remark by those especially interested in tuberculosis,⁴ and it will be recalled that the mistake was made so often in the army that it became necessary to restrict the diagnosis of tuberculosis to those cases with tubercle bacilli in the sputum. Comment on this significant fact is hardly necessary.

Complications in lobular pneumonia, according to my case records, are more common than with lobar pneumonia. Except in young children, otitis media can hardly be overlooked, but empyema and pulmonary abscess very frequently escape recognition. Some experience outside of medical centers has convinced me that the so-called "septic pneumonia" of rural districts is usually empyema. Two erroneous notions are primarily responsible for the failures of recognition of empyema: (1) the idea that empyema is accompanied by a definite type of temperature curve, and (2) the idea that empyema gives rise to definite, characteristic physical signs. Both of these conceptions are narrow and misleading. The diurnal variation of temperature which is expected is so frequently absent that the type of fever is of little aid in diagnosis. While it may be true that with empyema following lobar pneumonia the temperature comes to normal in the majority of cases and then again becomes elevated, this fact is seldom applicable to the fever of empyema following lobular pneumonia. The accompanying charts (1 and 2) illustrate the diversity of febrile reactions. In some cases a sharp rise in the pulse-rate is more significant than the temperature curve.

Occasionally small pleural abscesses become so walled off that there is slight or no fever, the patient remaining an invalid for indefinite periods. In one case of this type the history pointed to an ambulatory pneumonia fourteen months before as the cause of the abscess.

The physical signs of empyema are so variable and departures from the text-book descriptions so frequent that it is necessary to hold broad and elastic conceptions and abandon the definite picture customarily held. Some cases undoubtedly show characteristic changes on examination, such as a dull or flat percussion note, impaired or absent vocal fremitus, with distant suppressed breath sounds approaching a bronchial type; but again it must be recognized that exceptions are exceedingly common.

Pleural abscesses tend to be sacculated and the surrounding lung tissue may be either consolidated in part or markedly emphysematous. The variations in these structural changes in the lung paren-

⁴ Ash: Jour. Am. Med. Assn., January 2, 1915, lxiv, 11. McCrue and Funk, *idem*, July 19, 1919, lxxiii, 3.

chyma give origin to variations in physical signs; moreover, there seems to be a tendency for the focus of suppuration to take place first in a fissure between the lobes, with subsequent extension.

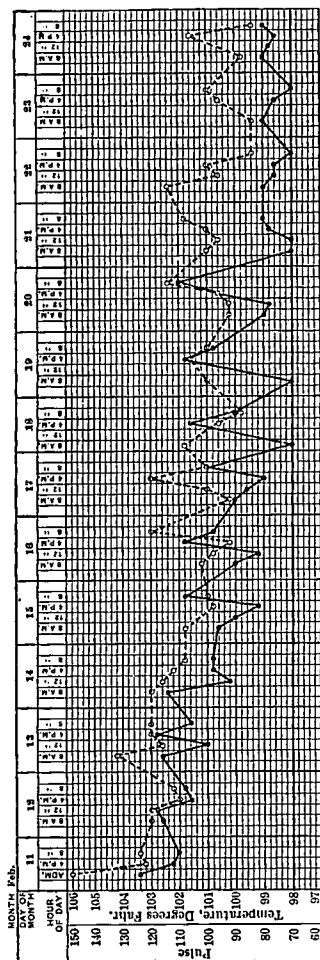


CHART I.—Typical bronchopneumonia. Empyema demonstrated on 19th.

When firm adhesions have been formed between the costal and parietal pleura there may be a thin lappet of air-containing lung between the ribs and pus. Postmortem examinations have revealed conditions of this sort and helped in an understanding of the marked variation in the peculiar physical signs. The fact should be emphasized that in many cases it is absolutely impossible to determine, by physical signs alone, whether the diseased condition in the lung is consolidation, fluid or both. The diagnosis, under these circumstances, can be determined only by exploratory puncture. Modified skodaic resonance in areas of the lung adjacent to collections of liquid has been to me of great assistance in diagnosis. The note elicited by percussion in the upper axillæ or over the lower portion

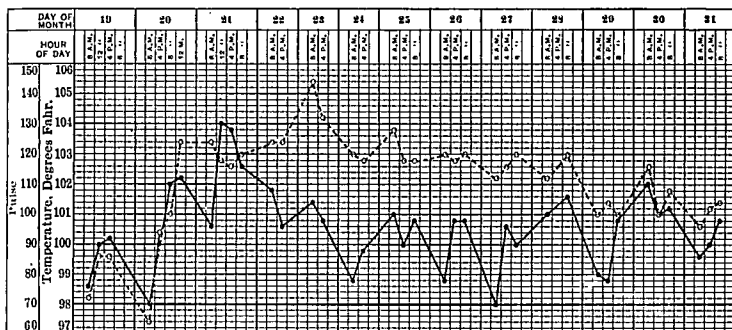


CHART II.—F. W., aged twenty-eight years. Case of Dr. Payne. Interstitial pneumonia (?). Empyema. On 20th, signs of slight bronchitis only; pain in the left chest. On 21st, at 10.30 A.M., careful examination failed to disclose suspected pneumonia; at 3.30 P.M. of same day, dullness, impaired fremitus and distant vesicular breath sounds over the left base posteriorly. Exploratory puncture. Pus. Infection due to *Streptococcus hemolyticus*. Aspirations; operation on 30th.

of the upper lobe overlying or adjacent to fluid has a high-pitched tympanitic quality approaching the amphoric. This peculiar alteration in the percussion note I have only seldom detected in a like degree over areas of lung adjacent to consolidation. This skodaic resonance is so marked that in several instances examiners of skill have mistaken the underlying condition for cavity. To me this sign is more significant than impairment of resonance or even flatness in the percussion note over fluid. Fluid is not always detected, even when present, because the exploring needle is not introduced in the proper area and sometimes, indeed, the fluid cannot be found. An interesting example of this occurred in my service at Camp Meade Base Hospital. A patient developed, following pneumonia, typical signs of fluid in the pleural cavity. There was no dissent concerning

the diagnosis. The chest was needled by the ward surgeon with no success, by the assistant chiefs, the chief, and later by others on the staff. No interspace from spine to sternum in the suspected area

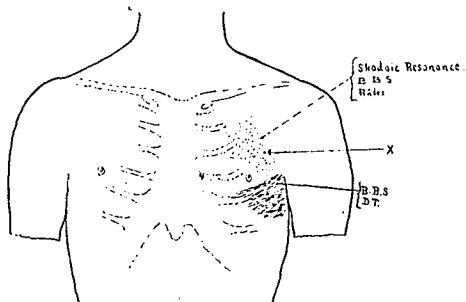


FIG. 3.—Atypical signs in empyema. Anterior view: Shading, impaired resonance to flatness; A, hyperresonant; B, skodaic resonance to amphoric; D.T., "dry tap," i. e., fluid not found; X, fluid determined by puncture; B.B.S., bronchial breath sounds; R, rales, crepitant and subcrepitant.

escaped. The patient finally improved, the fever disappeared but the signs persisted. One day while sitting on the ward porch he had an

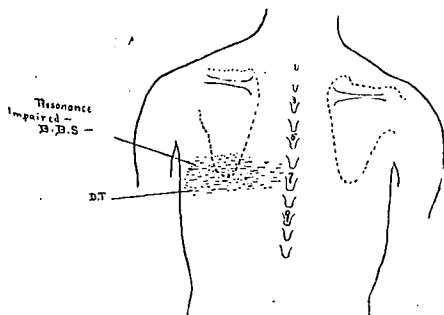


FIG. 4.—Atypical signs in empyema. Posterior view of same case as shown in Fig. 3: Shading, impaired resonance to flatness; A, hyperresonant; B, skodaic resonance to amphoric; D.T., "dry tap," i. e., fluid not found; X, fluid determined by puncture; B.B.S., bronchial breath sounds; R, rales, crepitant and subcrepitant.

attack of severe coughing and began to bring up pus. Some was lost, but the nurse saved over a pint as evidence of the correctness of the diagnosis. The patient made a perfect recovery. I know of

no guide that is infallible; certainly physical signs are often enough misleading. In many cases, however, there can be detected, by

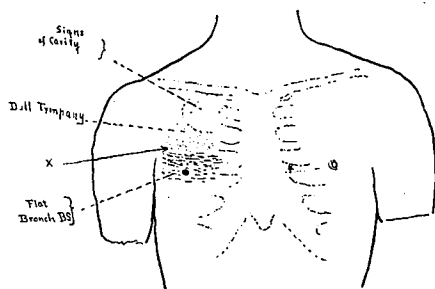


FIG. 5.—Atypical signs in empyema. Anterior view; Shading, impaired resonance to flatness; A, hyperresonant; B, skodaic resonance to amphoric; D.T., "dry tap," i. e., fluid not found; X, fluid determined by puncture; B.B.S., bronchial breath sounds; R, rales, crepitant and subcrepitant.

careful examination, some spot where pressure produces acute pain, and I have found that this area of hyperesthesia is the most promising site for exploration. The accompanying illustrations

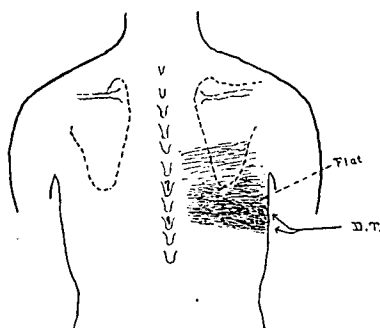


FIG. 6.—Atypical signs in empyema. Posterior view of same patient as shown in Fig. 5: Shading, impaired resonance to flatness; A, hyperresonant; B, skodaic resonance to amphoric; D.T., "dry tap," i. e., fluid not found; X, fluid determined by puncture; B.B.S., bronchial breath sounds; R, rales, crepitant and subcrepitant.

(Figs. 3, 4, 5 and 6) are of some interest, not only in depicting the peculiarity of physical signs in some cases of empyema but also in

showing that several unsuccessful explorations do not prove the absence of fluid. There is no explanation for the fact that the area of maximum flatness is needled so often with no result, and a proximate hyperresonant area is shown by puncture to overlie fluid. It must also be borne in mind that there may be more than one separate collection of pus.

Finally, in the diagnosis of empyema I cannot too strongly disagree with the teaching that there is always a displacement of neighboring viscera, *i. e.*, heart or liver. Abscesses in the pleura of considerable size can develop in a lung bound down by adhesions without appreciable displacement of neighboring organs. On the other hand, marked emphysema in the uninvolved lung may produce displacement of the heart toward the diseased side. This fact has been noted at autopsy.

In the treatment of these cases of empyema the conception no longer holds that diagnosis should be followed by immediate thoracotomy. Early operation, before firm adhesions have been formed surrounding the suppuration, leads to pneumothorax and infection of the whole pleural cavity. The mortality under these circumstances is known to be high. Repeated aspirations, on the other hand, allow time for adhesions to form; the patient during this interval recovers to some extent from the severity of the infection, and, when finally subjected to operation, not only is the local condition in the lung walled off and better suited for drainage, but the patient's general resistance is higher and he is better able to withstand the shock of operation. A small percentage (in my experience about six) of the cases of empyema will recover following repeated aspiration alone and never require surgery.

The question arises at this juncture, For how long a period should aspirations be continued: in other words, for how long can operation be postponed? The answer is not as difficult as it might seem. So long as the patient continues to improve operation can be deferred. The criteria for improvement are better appetite and sleep, a lower fever and pulse-rate and evidences of diminished infection, such as less sweating and improvement in the patient's sense of well-being and strength. On the average this period of improvement will continue for about ten days. With a few the period is prolonged into convalescence. In some cases the reason for final operation is that the pus becomes so thick that drainage cannot be effected through a large needle. With others the indication for operation is an increase in the temperature, a failing appetite and the general appearance of the patient.

Of the relation of pulmonary abscess to bronchopneumonia we have but little knowledge. In three of my cases of abscess of the lung the history indicated very strongly a beginning of the affection in bronchial pneumonia. In one of these cases this is more than

probable, since the pneumonia developed after operation, the so-called ether pneumonia. The reason for mentioning pulmonary abscess in the present connection is that occasionally pulmonary abscess can be cured by artificial pneumothorax. This procedure is indicated, however, only when there are no pleural adhesions, since, of course, with such adhesions the desired collapse of the lung cannot be produced. In two cases, where the abscess was in the mesial portion of one of the lower lobes, artificial pneumothorax resulted in an abatement of the symptoms and the last case treated is well up to the present time, a period of about two years since treatment was discontinued. When the abscess is near the pleura, as unfortunately it frequently is, adhesions usually occur and the only cure under these circumstances is lobectomy.

The most common of the sequelæ of bronchopneumonia, alike with lobar pneumonia, relates to the heart. Slight involvement of the myocardium, as manifested by breathlessness on exertion, is so common, following all types of pneumonia, that it is to be regarded as one of the incidents of convalescence. With not a few individuals, however, this symptom is prolonged for a number of months. Affections such as described are by no means confined to the elderly or to those who have some preëxistent cardiac disorder, but are manifested not infrequently in robust young men. The physical signs are seldom clear cut, and of themselves would hardly disclose the nature of the disorder. The heart sounds may not be as clear as they should be and occasionally a systolic murmur can be heard at the apex. But these signs can be noted in a considerable number of apparently healthy persons. The significant fact is the symptoms of circulatory embarrassment coming on after an acute infection. From a therapeutic point of view it is important first to recognize the nature of the disorder, with a view to protecting the patient against premature severe physical exertion. Time alone corrects the great majority of these disabilities. In addition, well-supervised graduated exercises have a distinct use, as was demonstrated on such a large scale in the military convalescent camps.

In conclusion, it is desirable to emphasize that bronchopneumonia is a common affection in young, robust individuals, and that, on account of the physical signs, the disease may, in mild cases, be easily overlooked. The treacherous character of bronchopneumonia and the seriousness of its complications and sequelæ indicate the importance of early recognition and adequate protective care.